NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTIVE STANDARD

RESIDUE MANAGEMENT, MULCH-TILL
(Ac.)
CODE 329B

DEFINITION

Managing the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round, while growing crops where the entire field surface is tilled prior to planting.

PURPOSES

This practice may be applied as part of a conservation management system to support one or more of the following:

1. Reduce sheet and rill erosion.
2. Maintain or improve soil organic matter content and tilth.
3. Conserve soil moisture.
4. Provide food and cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland and other land where crops are grown.

This standard includes tillage methods commonly referred to as mulch tillage, chiseling and disking, reduced tillage, or stale seedbed, flat-planted. It applies to stubble mulching summer fallowed land, as well as to tillage for establishing annual or perennial crops.

CRITERIA

General Criteria Applicable to all Purposes Named Above

A minimum of 30 percent cover of any combination of crop remains and/or volunteer vegetation shall be visible/measurable on the soil surface year-round. Where combines or similar machines are used for harvesting, they shall be equipped with spreaders capable of distributing residue over at least 80 percent of the working width of the header.

Residue shall not be burned.

Tillage implements shall be equipped to operate through plant residues without clogging, and to maintain residue on or near the soil surface by undercutting or mixing.

Planters, drills or air seeders shall be equipped to plant in residue distributed on the soil surface or mixed in the tillage layer.

Field conditions applicable to mulch-till systems include:

1. Undisturbed or shredded residue from previous crops.

2. Stubble or residue from small grain or other crops.

3. Established winter or summer cover crops.

Criteria applicable to seedbed preparation and planting include:

1. Seedbed preparation and planting may be accomplished in any manner provided that a minimum of 30 percent of the soil surface remains covered with residue. In most cases seedbed preparation will be limited to a single pass of a suitable implement. More than one pass of a suitable implement. More than one pass of a suitable implement for seedbed preparation may be possible when mulch-tilling into high residue producing crops or sod.

2. If full-width tillage is performed in the fall after harvest of the previous crop, a minimum of one preplant herbicide (burndown) shall be applied no later than 3 weeks prior to planting through a week prior to planting. If full width tillage is delayed until planting, a preplant application shall be made no later than 10 days prior to planting. A preplant herbicide application shall not be required where mulch-tilling into a perennial sod for the purpose of establishing annual forages for livestock grazing. A preplant herbicide application shall consist of one or more

approved preplant herbicides and shall be applied at rates sufficient to control the target species. Approved preplant herbicides are those herbicides labeled for preplant use in Louisiana and recommended by Louisiana Cooperative Extension Service (LCES) and Louisiana Agricultural Experiment Station (LAES) weed control specialist.

3. Planting shall be accomplished within dates recommended by the LCES for specific crops and crop varieties.

4. Weed control will be accomplished with approved herbicides. Mechanical cultivation may be used in emergencies. See OPERATION AND MAINTENANCE.

5. Fall chiseling or subsoiling necessary for shattering restrictive soil layers may be performed according to limitations in OPERATIONS AND MAINTENANCE.

Additional Criteria to Reduce Sheet and Rill Erosion

Tillage operations shall be limited to methods that leave residue on the surface and maintain the planned cover conditions.

Row width shall not exceed 42 inches, except during fallow year sugarcane rotations.

Standing row crop stalks shall be shredded using a rotary or flail mower or similar device.

On sloping fields, waterways shall be maintained in perennial grass or legumes.

Additional Criteria to Maintain or Enhance Soil Organic Matter Content

The amount of residue needed to maintain or enhance soil organic matter content shall be determined using the Soil Condition Indices for Louisiana. The index values will be computed by using the crop residue component, the tillage component, the soil erosion component, the mulch component, and the summer fallow component. Following are tables of data needed to compute the index values. Any sequence of crops that results in an average annual positive index value for all components outlined in the procedure will be considered adequate and will meet the specifications of this practice.

SOIL CONDITION INDICES FOR LOUISIANA

TABLE A – CROP RESIDUE COMPONENT

A.1- Minimum Residue Needed for Soil Maintenance (0.00 index value)*

Crop	Lbs. Per Acre
Fibrous Rooted	3,500
Tap Rooted	4,000

*Add (+) .025 for each additional 100 lbs. of crop residue above the soil maintenance requirements.

*Subtract (-) .025 for each 100 lbs. less than soil maintenance requirements.

A.2 – Estimates of Residue Production (lbs. per unit)

Crop	Unit	Lbs. Per Acre
Corn	bu.	70
Grain sorghum	lbs.	1.35
Soybeans	bu.	100
Cotton (lint)	lbs.	6
Wheat	bu.	100
Rice	bu.	100

Sugarcane	ton	600
Oats	bu.	80
Rye	bu.	90
Barley	bu.	70
Peanuts	bu.	60

A.3 – Double-Cropping Indices

	Yields		
Crop	Low	Medium	High
Wheat/soybeans	+ .00	+ .75	+1.00
Wheat/corn	+1.50	+2.00	+2.50
Wheat/grain sorghum	+1.50	+2.00	+2.50

	Yields/Bushels/Acre		
Crop	Low	Medium	High
Wheat	<30	30-40	>40
Soybeans	<20	20-30	>30
Corn	<60	60-90	>90
Grain sorghum	<50	50-80	>80

A.4 Perennial Crops (included in cropping sequence)

Duration of Perennial Crops in Rotation	Soil Condition Indices for Perennial Crops Harvested as Hay, Silage, or Green Chop		
	Grass	Legume	Grass & Legume
1 year	+ 1.00	+ 1.00	+ 1.00
2 years	+ 3.00	+ 2.50	+ 3.00
3 years	+ 4.00	+ 3.00	+ 4.00
4 years	+ 4.50	+ 3.50	+ 4.50
5 years	+ 5.00	+ 3.75	+ 5.00

> 5 years, add .20 for each additional year

A.5 – Vegetable Crops (add +.025 for each 100 lbs. of residue returned to soil)

Non-root harvest such as lettuce melons, tomatoes cabbage, etc.	Root and tuber crops such as potatoes, beets, carrots, and radishes	Strawberries and other perennials
-1.50	-2.0	-1.50 (1st yr.) -1.00 (establ. stand)

A.6 – Cover Crops and Green Manure Crops are Accounted for by Their Contribution of Biomass Returned to the Soil*

Add .00025 for each pound of air dried material returned to the soil.

*Assume 3500# air dried material per acre

TABLE B – TILLAGE COMPONENT
(Includes Secondary Seedbed Tillage)

	Annual Tillage Indices		
Tillage System	Mechanical Weed Control	Chemical Weed Control	Combination Mechanical/ Chemical
Conservation Tillage			
No-Till	N/A	+ 1.00	N/A
Reduced Till	0	+ .50	+ .25
Conventional Tillage			
1-2 Primary Till	- 1.00	- .50	- .75
3-4 Primary Till	- 2.50	- 1.50	- 2.00
4 > Primary Till	- 2.75	- 1.75	- 2.00

TABLE C – EROSION COMPONENT

Sheet & Rill Erosion Rate	Fibrous Rooted	Tap Rooted
0-3 tons	+ 2.0	+ 2.0
3-5 tons	+ 1.5	+ 1.5
5-8 tons	0.0	0.0
8-10 tons	- 1.0	- 1.5
11-15 tons	- 1.5	- 2.0
16-20 tons	- 2.0	- 2.5
20 > tons	- 2.5	- 3.0

TABLE D – MULCH COMPONENT
(added values per ton of dry material)

Material	Indices
Cow Manure	+ .70
Sheep Manure	+ .80
Poultry Manure	+ .90
Gin Trash	+ .50

Straw or Grass Hay	+ .50

TABLE E – SUMMER FALLOW COMPONENT

Tillage Implements Used and Operation	Index Rating Per Operation
Subsoilers (deeper than 16")	- 0.60
Moldboard plow	- 0.50
Disc plow	- 0.50
Chisels (8-12" depth)	- 0.40
Chisels (12-16" depth)	- 0.50
Tandem disc (including offset)	- 0.40
Sweeps (including wide V-blade)	- 0.30
Shallow cultivating implements (such as light springtooth Harrows, spiketooth harrows, rodweeders)	- 0.35

Additional Criteria to Conserve Soil Moisture

Residue shall be evenly distributed and maintained on the soil surface during growing season or fallow-period to retain soil moisture for crop use by enhancing infiltration or reducing evaporation.

When planting with a mulch-till system in areas with limited moisture, moisture for germination can be increased by completing tillage and planting in a single operation, or by performing tillage no more than three days before planting.

Additional Criteria to Provide Food and Cover for Wildlife

A minimum of 30 percent cover of any combination of crop remains and/or volunteer vegetation shall be maintained on the soil surface year-round to provide food and cover for wildlife.

Residues shall not be removed unless it is determined by the Louisiana Wildlife Habitat Evaluation for Resource Management Systems that such removal will not adversely affect habitat values.

Tillage shall be delayed until the end of the residue management period to maintain the food and cover value of the residue.

CONSIDERATIONS

Residue Removal

Excess removal of plant residue by such mean as baling or grazing often produces negative impacts on resources. These activities should not be performed without full evaluation of impacts on the soil, water, air, plant, and animal resources.

Cropping Sequence

Mulch tillage may be practiced continuously throughout the croppping sequence, or may be managed as part of a system which includes other tillage methods such as no-till.

Residue Amounts

Production of adequate amounts of crop residue necessary for the proper functioning of this practice can be enhanced by selection of high residue producing crops and crop varieties, use of cover crops, and adjustments of plant populations and row spacing.

Soil Improvement

The use of undercutting implements will enhance the accumulation of organic material in the surface layer.

Wildlife Habitat Improvement

The value of residues for wildlife habitat can be enhanced by leaving rows of unharvested crop standing at intervals across the field.

PLANS AND SPECIFICATIONS

Specifications shall be prepared for each field office according to the Criteria and O&M described in this standard and recorded in narrative statements in the conservation plan. Louisiana Agronomy Technical Note No. 77 provides additional information on mulch-till systems.
Residue Amounts shall be determined using the line transect method. Directions for estimating residue cover using the line transect method can be found in the National Agronomy Manual (Subpart E-Crop Residues) "Estimating Crop Residue Cover," pages 503-25.

Residue amounts shall be recorded using narrative statement s in the conservation plan or either of the Crop Residue Management Worksheets in Subpart E of the National Agronomy Manual.

OPERATIONS AND MAINTENANCE

All pesticides used in mulch-till systems shall be labeled for their intended use in Louisiana and shall meet either of the following conditions:

1. Be contained in the current year Louisiana Weed, Insect, and Disease Control Guide published by LCES annually, or

2. Be recommended for their specific purposes by LCES or LAES specialist.

The number , sequence, and timing of tillage and planting operations, and the selection of ground-engaging components, shall be managed to achieve a minimum of 30 percent cover of any combination of crop remains and/or volunteer vegetation visible/measurable on the soil surface year-round.

Mechanical cultivation for weed control will be limited to emergency situations, and tillage shall be limited to undercutting operations which minimize burial of surface residue.

Information concerning retention and burial of crop residue by various tillage implements can be found in the National Agronomy Manual (Subpart E-Crop Residues, Table No. 3), "Residue Retention-Burial, Implement Operating Data," pages 503-16 through 503-20.